DOCUMENT RESUME

ED 455 768 IR 020 724

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TITLE	Uses of the World-Wide Web by Adolescents in Public Schools.
PUB DATE	2000-10-00
NOTE	14p.; In: Annual Proceedings of Selected Research and Development Papers Presented at the National Convention of the Association for Educational Communications and Technology (23rd, Denver, CO, October 25-28, 2000). Volumes 1-2; see IR 020 712.
PUB TYPE	Reports - Research (143) -- Speeches/Meeting Papers (150)
EDRS PRICE	MF01/PC01 Plus Postage.
DESCRIPTORS	Comparative Analysis; Computer Assisted Instruction; *Computer Uses in Education; High School Students; High Schools; Middle School Students; Middle Schools; School Surveys; *Student Attitudes; Student Research; Use Studies; *World Wide Web
IDENTIFIERS	Web Sites

ABSTRACT

This study was designed to explore how some students in 10 public schools view the World Wide Web and how their attitudes and opinions affect their use of this new medium in an educational context. An exploratory principal components analysis of 40 use statements resulted in an 8-factor solution. Additionally, student responses to a computer-administered survey instrument were collected and analyzed revealing, significant differences in the way that students describe their use of the Web. Gender, grade level, and amount of time spent using the Web were used to create between-group comparisons of the Web use categories that made up the computer-administered survey instrument. The final phase of data analysis was a content analysis of sites visited by students. A total of 123,071 URLs were collected from the computers used to administer the computer survey instrument. These were reduced to a total of 500 sites that were reviewed by media specialists. Students were found to be visiting commercial sites at a much higher proportion than those in other domains. Also, the commercial sites received the lowest rating for "suitability for academic research" of all the domain names. And while students reported their purpose for using the Web as "research and learning" 52 percent of the time, the coders found only 27 percent of the sampled sites to be "suitable" for that purpose. (Contains 39 references.) (Author/AEF)

ED 455 768

Uses of the World-Wide Web by Adolescents in Public Schools

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Abstract

This study was designed to explore how some students in ten public schools view the WWW and how their attitudes and opinions affect their use of this new medium in an educational context. An exploratory principal components analysis of forty use statements resulted in an eight factor solution. Additionally, student responses to a computer-administered survey instrument were collected and analyzed revealing significant differences in the way that students describe their use of the WWW. Gender, grade level, and amount of time spent using the WWW were used to create between-group comparisons of the WWW use categories that made up the computer-administered survey instrument. The final phase of data analysis was a content analysis of sites visited by students. A total of 123,071 URLs were collected from the computers used to administer the computer survey instrument. These were reduced to a total of 500 sites that were reviewed by media specialists. Students were found to be visiting commercial sites at a much higher proportion than those in other domains. Also, the commercial sites received the lowest rating for "suitability for academic research" of all the domain names. And while students reported their purpose for using the WWW as "research and learning" fifty-two percent of the time, the coders found only twenty-seven percent of the sampled sites to be "suitable" for that purpose.

Introduction

This [PC/Internet] technology promises to have a far larger and more serious impact on our society than the introduction of television, possibly as great an influence on history as the industrial revolution or the printing press. Television primarily involves only leisure time; this technology will affect work, school and play—personal, family and business relationships. Surveying the Digital Future: How the PC and Internet Are Changing the World.

The introduction of a new medium into society has frequently been a flash-point for media effects research focusing on children and adolescents (Wartella & Reeves, 1985). In each case children have been recognized as a special audience, one that deserves special consideration (Dorr, 1986; Wartella, 1995). The introduction of television prompted numerous studies (e.g., Schramm, Lyle & Parker, 1961), and provoked much discussion and public debate over its proper place in society. The effects of the media on children's mental development has been a common theme (e.g., Van Evra, 1990; Winn, 1977). From early on, media effects researchers have focused the attention of the nation on the media's dysfunctional effects. From the Payne Fund studies on the effects of motion pictures (e.g., Charters, 1933; Dale, 1935) to Dr. Fredrick Wertham's (1954) exposé of comic books to the Surgeon General's (1972) report on television and violence, social scientiara have examined how the media have served to undermine the positive influences of family and social institutions (McLeod & Reeves, 1980; Wartella & Reeves, 1985).1

Researchers exploring the effects of educational media, however, have argued from a similar set of assumptions to reach dramatically different conclusions. Instead of exploring the possible negative effects of the media, proponents of "powerful effects" have heralded the positive effects promised by the use of educational media in the classroom (e.g., Kozma, 1994; Salomon, 1978). The history of educational technology, specifically the use of mass media in an educational context, is infused with promises of revolutionary proportions (Cuban, 1986). Access to books, instructional motion pictures, radio, and more recently television and interactive multimedia has been envisioned as the panacea for all that ails our educational system. The use of the World Wide Web in the classroom is only the latest in a long history of mass media technologies that have been embraced by the educational establishment. Libraries, along with the liberating technologies of the postal service and telephones, were once envisioned as facilitating the elimination of schools (Illich, 1970).2 Educational films, radio and television programs, and educational computer software have all been employed with similar hope and optimism. The belief that the Web will lead to the promised land is but the most recent manifestation of this technological utopianism.

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M. Simonson

Statement of the Problem

The Internet, and more specifically the WWW, is being eagerly adopted by school districts, administrators, and teachers almost without exception. However, the use of the WWW in the classroom marks the first deployment of an educational medium in which the end user can access a virtually unlimited breadth of content. Hecht (1997) argued, "having the Internet in the classroom is like equipping each classroom with a television that can be turned on at any time and tuned in to any of 100,000 unrestricted channels, only a tiny fraction of which are dedicated to educational programming (and even those have commercials)." McNealy (1999) voiced a similar concern when he wrote, "Right now, putting students in front of Internet terminals is no better than putting them in front of TV sets. It may even be worse" (p. 17A). And while the resource is huge-Lawrence and Giles (1999) estimated 800 million web pages-some have argued that only a fraction of the millions of Web pages hold any educational value for this K-12 audience (see, for example, Bennett, Wilkinson, & Oliver, 1996; Kirk, 1996; Tillman, 1998).

This raises some interesting questions regarding the use of the WWW in an educational context. Even students who seek out educational content may be thwarted by the very attributes heralded by WWW proponents, e.g., the WWW's breadth and depth of information. Research into selective exposure, defined as "behavior that is deliberately performed to attain and sustain perceptual control of particular stimulus events," (Zillmann & Bryant, 1985, p. 2) has raised questions about new media technologies that provide an abundance of choice and place even greater control over consumption in the hands of the consumer. In a nonlinear medium, when educational content is sometimes packaged as "edu-tainment," what is to prevent students from skipping over the "education?" Preliminary data collected during a pilot study (Ebersole, 1999) indicated that for middle and high school students accessing the WWW from computers in public schools, the most frequently visited sites were those that were also the least educational. And while "research" was the most frequent response to the question "why are you using the WWW at this time?" content analysis of the sites visited suggested that "looking for something interesting" was the more likely explanation for the majority of sites visited.

Significance of the Study

There have been calls for research to determine the effect of computers with Internet access on student achievement (Kozma & Quellmalz, 1996). Linda Roberts, Director of the Office of Educational Technology, spoke at the SchoolTech Exposition and Conference and reminded educators of the need to collect data that will support or reject the spending of billions of dollars for computers and wiring (Mendels, 1998, April 27). A recent US Department of Education report (National Center for Educational Statistics, 1997) concluded by listing four challenges that remain for educators and school districts as they embrace this new educational technology. The challenges are: technical support for hardware and software; teacher training and development; "increasing effective use of the Internet to enhance student learning; and protecting students from inappropriate material on the Internet". Research into the use of the WWW in public schools has important implication for local, state, and national policy and funding initiatives. While a study such as the present one is only a small step in the quest to assess the value of this new medium, it is important in that it permits identification of the motivations of individual users. The study can also help to identify crucial points where intervention may be necessary in order to realize the WWW's full potential as an educational resource. Once we understand what motivates students to utilize this medium, we can better design incentives that encourage educational use and discourage use that distracts students from that goal.

Theory: Uses and Gratifications

According to Rice and Williams (1984), "the new media provide fertile test beds for many of our theories and models" (p. 55). One mass media theory that has repeatedly been cited as holding promise for the analysis of new media is uses and gratifications. In addition to the article by Rice and Williams, articles by Williams, Strover and Grant (1994), Newhagen and Rafaeli (1996), Morris and Ogan (1996), and December (1996) have also included references to the suitability of uses and gratifications for new media research. As an "active audience" theory, uses and gratifications provides a vantage point from which to look at the ways that audiences respond to the breadth and depth of information that is made available by these new media. Newhagen and Rafaeli (1996) have suggested that uses and gratifications theory may be especially useful because of the "mutability" of the Web, or what Newhagen calls its "chameleon-like character" (p. 11). The diversity of content is much greater for the WWW than for traditional electronic media. While television, radio, and to a lesser degree print media are subject to regulatory and societal scrutiny, the WWW is virtually unregulated. Because of this, the WWW literally has something for everybody. The fact that this range of material is available at school, library, workplace, and home would suggest that potential uses for the Internet may far exceed those provided by other media.

Few studies have taken a uses and gratifications approach to studying the Internet and even fewer have narrowed their focus to look at the WWW (e.g., Charney, 1996; Stetter, 1997; Yoo, 1996, and Kaye, 1998). December (1996) identified "communication, interaction, and information" as the three broad categories for why people use the Internet. Charney (1996) concluded from a study of university students that the Internet is used "to keep informed, for entertainment and diversion, to maintain communication, and to look at the sights and sounds of the 'Net" (p. 88), but most frequently for entertainment-diversion (p. 90). A 1995 study of college students' WWW usage resulted in "six motivational categories: entertainment, social interaction, passing the time, escape, information, and Web site preference" (Kaye, 1998, p. 34). According to the 9th WWW User Survey conducted by Georgia Tech (GVU's 9th WWW user survey, 1998), the WWW's youngest users (11-20) use the web mainly for "entertainment" (81%), "education" (70%), "time wasting" (67%), and "personal information" (60%).

Methods

Combining qualitative and quantitative approaches, this study employed open-ended questions, interviews, two types of survey research, and content analysis of WWW sites visited by students. Some of the data was collected with the active participation of the subjects, while other data was collected using passive data collection techniques. Using multiple methodologies allowed for increased richness of data and a clearer picture of the phenomena under investigation.3

Subjects

The population for this study was comprised of middle-school and high-school students at selected public schools in five districts in a western state. The districts were selected in consultation with the state's Department of Education to reflect a cross-section of schools in urban and rural settings that have Internet access. The participants for this study were selected using two different approaches. For the first survey, which was administered on paper, a stratified convenience sample was employed. At one middle school and one high school in each district a class representing each grade (sixth, seventh, eighth, ninth, tenth, eleventh, and twelfth) was selected to take the paper survey. The second survey was administered electronically at the computer. Students attending middle and high schools in these districts have access to the WWW using computers available in the schools' media centers. However, not all students had parental permission to access the WWW. Only students who had been granted parental permission and who had signed and submitted the required forms to their local school administrators were permitted to access the computer-administered survey. Of these, participation in the second phase of the survey was voluntary and by self-selection. The survey was installed as the default home page in the media centers for a period of time sufficient to gather approximately 100 responses from each school.

Survey Data Collection

The two primary survey instruments employed in the current study will be referred to as the "paper survey" and the "computer survey." The paper survey is a 75-item survey instrument that was administered to students in their classrooms at selected public middle schools and high schools. The paper survey contains sections designed to measure the students' : 1) affinity for the WWW, 2) assessment of the value of the WWW for various purposes, 3) skill level for computer and WWW use, 4) use of the WWW, 5) avoidance of the WWW, and 6) demographics. Following this, the computer survey was administered to the students at the time and place of their access to the WWW-specifically the school's media center or library. The computer survey is comprised of just four questions: grade, gender, how much the student uses the WWW, and the student's purpose for using the WWW at this particular time. This survey was intentionally kept very short in order to prevent student frustration and a perception of "time-off-task" that may have jeopardized the support of school administrators.

Passive Data Collection Design for This Study

December (1996) and Newhagen and Rafaeli (1996) recognized the fact that the Internet provides excellent opportunities for data collection. As Rafaeli noted, any social scientist who has looked at an Internet server must be struck by the research possibilities present in the data that is passing through that computer (p. 6). In order to take advantage of this unique feature of the WWW, the design of this study calls for passive data collection to follow the survey research. Both Netscape Navigator and Microsoft's Internet Explorer browsing software generate a cache or "global history" file that resides on the user's hard drive and which retains a list of addresses (Uniform Resource Locators or URLs) of WWW sites last visited. This list of URLs listing WWW pages and graphics visited most recently is extensive and can be thousands of sites long.

At the beginning of the data collection phase the cache files on the computers in the schools' Media Centers were deleted. At the end of the collection period the cache files were copied to a disk and the data prepared for analysis. A total of 123,071 URLs were collected from the more than 80 Macintosh and Windows personal computers on which the survey instrument had been installed. First, the number of occurrences of web sites from the five generic top-level domains (commercial [.com], educational [.edu], governmental [.gov], network [.net], and organizational [.org]), and the United States (.us) domain was recorded. In order to facilitate content analysis of the sites visited, URLs ending with .gif and .jpg were first stripped from the list and then a UNIX grep script was written and applied to the remaining sites to reduce the list to the number of randomly selected sites that could be evaluated and coded given the time and resources available. The subsequent 500 URLs were then collected into a single WWW page and two educators/media specialists, one male and the other female, from a nearby school district were asked to analyze these WWW pages and serve as evaluators. The pages were assigned a "use" category based on the same choices that had been presented to the students on the computer-administered survey and were rated for "suitability as a source for academic research" on a scale of 1-3: 1 = not suitable, 2 = questionable, and 3 = suitable. The evaluators were instructed to look at each WWW page with consideration for the grade level of the students being studied.

Results

Respondents to the paper survey (n = 791) ranged in age from 10-21 years (M = 14.45) and were enrolled in the 6th grade (12%), 7th grade (130, 17%), 8th grade (123, 16%), 9th grade (14%), 10th grade (15%), 11th grade (12%), and the 12th grade (16%). Average self-reported grade point average (GPA) was 3.28, and 51% were male. Ethnicity of respondents is as follows: American Indian (2%), Asian (3%), Black (9%), Hispanic (16%), White (69%), and other (2%). Respondents to the computer-administered survey (n = 1083) were enrolled in the 6th grade (5%), 7th grade (21%), 8th grade (19%), 9th grade (14%), 10th grade (15%), 11th grade (12%), and the 12th grade (16%). Of these, 59% were male.

Attitudes towards the WWW

Questionnaire items 1 through 5 were statements designed with the goal of determining the students' affinity for the WWW. This was operationalized by summing five Likert-scale responses with results ranging from 5-25 (M = 12.57, SD = 4.12, Cronbach's alpha = .83). The statement "Using the WWW is very important to me" received the strongest support (M = 3.05) while the statement "I would feel lost without the WWW" received the least (M = 1.97).

The next set of items was designed to explore the students' beliefs about the WWW-in particular the WWW's value as a source of information, entertainment, and as a means of communication. As a source of information (M = 1.68, 1 = excellent, 4 = poor), students rated the WWW as "excellent" 44% of the time, "good" 46% of the time, "fair" 9% of the time, and "poor" 2% of the time. As a source of entertainment (M = 1.90), students rated the WWW as "excellent" 36% of the time, "good" 42% of the time, "fair" 18% of the time, and "poor" 4% of the time. And as a means of communication (M = 1.78), students rated the WWW as "excellent" 42% of the time, "good" 42% of the time, "fair" 14% of the time, and "poor" 3% of the time. Based on these responses, students rate the WWW highest for information, followed by communication, and then entertainment.

The most common response to a general question asking overall skill at using computers was "good" (47%), followed by "average" (30%), "excellent" (20%), and "below average" (3%). Additional questions asked students how long they have being using the WWW, how many times per week, and how many hours per week they use the WWW. To the question, "For how long have you been using the World-Wide Web?" the most common response was "1-2 years" (32%), followed by "more than 2 years" (29%), "6 mo.-1 year" (23%) and "less than 6 months" (17%). To the question, "Approximately how many times per week do you use the World-Wide Web?" the most common response was "1-2 times" (35%), followed by "less than 1" (28%), "3-5 times" (23%), and "more than 5 times" (15%). And in response to the question "About how many hours per week do you use the World-Wide Web?" respondents answered "1-2 hours" (34%), "less than 1" (33%), "3-5 hours" (20%), "6-10 hours" (9%), and "10+ hours" (5%).

An additional four items assessed the respondent's skill at using the WWW. Students' self-reported skill at using the WWW was operationalized as the sum of responses to four Likert-scales. Skill at using the WWW ranged from 4 to 20 (M = 13.86, SD = 3.25, Cronbach's alpha = .78).

Students were also asked to indicate the locations where they access the WWW. The 625 students who responded to question 20 indicated the following places were used to access the WWW; home (69%), school (61%), friend's house (32%), public library (23%), and, other (11%).

Reasons for using the WWW

Questionnaire items 21 through 60 addressed reasons why students might choose to use the WWW. These items were generated from statements made by middle school and high school students who responded anonymously to an open-ended question asking them to list several things "that the World-Wide Web is good for." Additional use statements were taken from fill-in-the-blank responses to the computer survey questionnaire in the pilot study.

Because of the paucity of research in uses and gratifications of the relatively new WWW, exploratory factor analysis (SPSS Principal Components Analysis with Varimax rotation) was employed to group these use statements into categories. A preliminary principal components analysis was performed on an incomplete data set in order to arrive at a list of "use statements" that became part of the computer-administered survey instrument. Those seven use statements were: "for research and learning," "to communicate with other people," "for access to material otherwise unavailable," "to find something fun or exciting," "for something to do when I'm bored," "for sports and game information," and, "for shopping and consumer information." Once the complete data set was collected via the paper survey instrument, another principal components analysis was conducted. This time the result was eight factors with eigenvalues greater than 1.0 accounting for a total of 58% of the total variance. These factors differed slightly from those derived from the earlier analysis.4 (see Table 1).

Table 1

Items	FAC1	FAC2	FAC3	FAC4	FAC5	FAC6	FAC7	FAC8
Factor 1: Research and Learning								
(eigenvalue = 10.57, variance after rotation = 14%)								
Because it is a good source of news	.488	.237	-.048	.117	.266	.141	-.165	.238
To complete homework assignments	.553	.063	.114	.031	.296	-.336	.392	.047
To get up-to-date facts and information	.445	.195	.026	.080	.214	.224	-.117	.397
To learn how to use computers better	.423	.307	.172	-.095	-.019	.206	.195	.074
To learn new things †	.501	.554	.140	.019	.132	.045	.009	.082
Because it provides a new outlook on learning	.727	.264	.149	.000	.067	.113	-.045	.015
Because it's educational	.749	.237	.054	-.071	-.024	.110	-.047	-.052
To find articles and references	.675	-.115	-.008	.035	.270	.241	-.086	.071
Because it is an excellent source of information	.682	.118	.085	.126	.233	.025	-.090	.056
To find out what's going on in the world	.566	.175	.227	.269	-.058	.256	-.037	.196
So that I can do better in school	.763	.190	.140	.077	-.048	-.014	.077	.007
To conduct research for class	.766	-.061	.009	.026	.214	-.046	.013	-.046
Factor 2: Easy Access to Entertainment								
(eigenvalue = 3.73, variance after rotation = 9%)								
Because it's so easy	.185	.521	.049	.203	.286	-.007	-.161	.256
Because it's fun	.094	.746	.129	.281	.148	.037	.091	.091
To learn new things †	.501	.554	.140	.019	.132	.045	.009	.082
To play games †	.036	.434	.102	.325	.028	.030	.537	.068
Because it's exciting	.238	.712	.180	.177	.063	.084	.130	-.001
For entertainment †	-.002	.508	.212	.467	.149	.076	.190	.077
To find interesting things	.351	.573	.117	.121	.206	.237	-.007	.024
Because computers are cool †	.226	.453	.105	.428	-.075	.331	.094	-.096
Factor 3: Communication and Social Interaction								
(eigenvalue = 2.19, variance after rotation = 9%)								
To chat with other people	-.030	.033	.716	.220	.241	-.103	.161	.122
To find people	.086	.101	.637	.056	.104	.027	.158	.232
So that I can have foreign language friends	.168	.232	.594	-.034	-.129	.221	-.089	.110
To email friends	.096	-.005	.520	.263	.279	.082	-.079	.184
To talk with people from around the world	.145	.156	.788	.061	-.020	.123	.038	.011
To meet new people	.116	.106	.801	.165	-.003	.135	.009	.063

Factor 4: Something to Do When Bored								
(eigenvalue = 1.68, variance after rotation = 7%)								
For entertainment †	-.002	.508	.212	.467	.149	.076	.190	.077
For browsing	.266	.185	.109	.510	.254	.239	-.007	-.022
Because it gives me something to do	.018	.258	.186	.761	.055	.045	.100	.104
When I'm bored	-.003	.152	.155	.796	.085	-.017	.064	.106
Because computers are cool †	.226	.453	.105	.428	-.075	.331	.094	-.096
Factor 5: Access to Material Otherwise Unavailable								
(eigenvalue = 1.53, variance after rotation = 6%)								
To find things not in the library	.240	.060	-.020	-.004	.652	-.041	-.063	-.088
Because it is convenient	.143	.198	.131	.264	.537	.041	-.088	.170
To download software and other free stuff †	-.115	.177	.217	.042	.425	.438	.302	.153
Because I can access things otherwise unavailable to me	.167	.178	.119	.086	.617	.280	.067	.020
Factor 6: Product Info and Tech Support								
(eigenvalue = 1.17, variance after rotation = 5%)								
To download software and other free stuff †	-.115	.177	.217	.042	.425	.438	.302	.153
To get product information	.197	.102	.136	.040	.245	.489	.044	.125
To get information about games †	.011	.292	.067	.272	-.012	.467	.511	-.002
To get technical support	.348	.097	.261	.127	.064	.610	.148	.096
Factor 7: Games and Sexually Explicit Sites								
(eigenvalue = 1.09, variance after rotation = 5%)								
To get sports information and statistics †	.243	-.002	-.018	.072	-.072	.194	.439	.413
To access sexually explicit sites	-.191	-.001	.058	-.001	-.032	.055	.672	.077
To play games †	.036	.434	.102	.325	.028	.030	.537	.068
To get information about games †	.011	.292	.067	.272	-.012	.467	.511	-.002
Factor 8: Consumer Transactions								
(eigenvalue = 1.08, variance after rotation = 4%)								
For shopping and making purchases	.001	.023	.247	.054	-.015	.089	.107	.701
To look up music and concert information	.020	.138	.268	.084	.102	-.010	.092	.674
To get sounds, pictures, or animations for projects *	.259	.360	.077	.091	.366	.097	.180	.199
Cronbach Alpha (for scale)	.887	.844	.823	.813	.601	.653	.617	.577

* Denotes item that did not meet the criteria for factor loading

† Denotes item that loaded highly on two factors

Correlation Analyses

Following the independent-sample t tests, Pearson product-moment correlation coefficients were computed among the eight WWW use scales and three variables measured at the interval level. The three variables that were correlated with the eight factors were grade, affinity for the WWW, and skill level at using the WWW. Not surprisingly, both affinity and skill are positively correlated with every type of use as defined by this study. The few significant correlations between grade and uses suggest that students in the lower grades are more likely to say that they use the WWW for easy access to entertainment, for something to do when bored, for product information and technical support, and for games and sexually explicit sites. Likewise, students in the higher grades are more likely to say that they use the WWW for access to material otherwise unavailable. A significant negative correlation was obtained between grade level and affinity for the WWW ($r = -.15$, $p = .001$). This suggests that as respondents increase in age and grade level, they become less enamored of the WWW. Note, however, that this reduction in affinity for the WWW does not appear to result in less use with increased age. The correlation between grade level and skill level was not significant ($r = -.02$, $p = .717$). The lack of correlation between grade and skill level may be

accounted for by the likelihood that students rated their skill level against that of their peers rather than against an objective scale.

Reasons for avoiding the WWW

In addition to seeking reasons why students choose to use the WWW in a school setting, questions were asked in an attempt to discover possible reasons why students would choose to avoid using the WWW. Ten avoidance statements were presented to students who were asked to respond on the same agree/disagree scale. An analysis of the avoidance statements suggested that face-to-face interaction with peers is the leading reason given for not spending time using the WWW. Other important factors included several statements about negative issues commonly attributed to the WWW, e.g., pornography, illegal activity, and other users who may have suspect motives. And while schools often have fast connections to the Internet, these users appeared to be consistent with the general population of WWW users who perceive the WWW to be too slow, especially when downloading graphically intensive sites. On a positive note, the social stigma that has been associated with computer expertise-i.e., that "computers are for nerds"-does not appear to carry much weight with these respondents.

Results of the Computer-Administered Survey

Unlike the nearly even split by gender in the paper survey, the respondents to the computer-administered survey were slightly more than 59% male. This could indicate that males are heavier users of the WWW at school, or that they were more likely to respond to the survey. While the breakdown of respondents by grade level to the paper and computer surveys was identical for high school students, there was a substantial difference in the number of sixth, seventh, and eighth grade students responding to the two surveys. The reduced percentage of sixth grade students responding to the computer-administered survey was explained in part by the fact that one district did not provide Internet access to sixth grade students. Because there was no way to prohibit multiple responses from students responding to the computer-administered survey, the data reported here should not be interpreted as representing unique students, but rather as sessions at a computer.

In response to the question asking the average amount of time spent using the WWW each week, the most common response was, "less than 1 hour per week" (36%) followed by "1 to 2 hours per week" (23%), "3 to 5 hours per week" (18%), "more than 10 hours per week" (17%), and "6 to 10 hours per week" (6%). Respondents to the computer-administered survey gave the following reasons for using the WWW: "for research and learning" (n = 541, 52%), "to communicate with other people" (n = 74, 7%), "for access to material otherwise unavailable" (n = 55, 5%), "to find something fun or exciting" (n = 85, 8%), "for something to do when I'm bored" (n = 56, 5%), "for sports and game information" (n = 65, 6%), and, "for shopping and consumer information" (n = 10, 1%). In addition, 165 students (16%) chose not to select from the seven options presented. Of these, 94 students elected to write-in a response to this question. The write-in responses offered by students to explain their purpose for using the WWW were grouped into categories as follows: specific research topics (n =20), sexually explicit material (n =20), games and amusements (n =14), general research and learning (n =11), combinations of things (n =10), communication (n =5), and other unclassified (n =14).

Content Analysis of Sites Visited

Because there are normative expectations for media content consumed in school for educational purposes, content analysis of sites visited by students was employed to better understand the nature of the content being consumed. Of the 123,071 URLs collected, 77% (n = 94,426) were from the .com domain, 5% (n = 6,289) were from .net, 5% (n = 5,704) were from .org, 4% (n = 4,842) were from .edu, 1 percent (n = 1,640) were from .gov, 1% (n = 1,403) were from .us, and 7% (n = 8,767) were from another or unidentified domain name. These numbers stand in contrast to the distribution of domain names that makes up the current state of the WWW. According to the latest survey of WWW domain names by host count, conducted by Internet Software Consortium in January of 2000, the actual make-up of the WWW is not as heavily skewed towards the commercial domain sites as the student sample would suggest (see Table 2).

Table 2
Domain Names by Host Count

Domain Name	Number of sites*	% of total (com, net, edu, us, org, gov)	% of 123,071 Web pages visited by students
com (commercial)	29075185	50.4	77
net (network)	18305485	31.7	5
edu (education)	6313781	10.9	4
jp	2680659		
uk	2240216		
us	2062653	3.6	1
mil	1908413		
de	1778831		
ca	2153807		
au	1181376		
org (organization)	1063901	1.8	5
nl	839912		
fr	867981		
gov (government)	842854	1.5	1
Total	57663859	99.9%	93% (7% = other)

*Source: Internet Software Consortium, January 2000

The next step was a more detailed content analysis of randomly selected WWW pages visited by students. Once intercoder reliability was established at an adequate level (alpha = .92), the 500 randomly selected WWW pages were analyzed for educational value and use category. The "suitability" rank most often assigned by the evaluators was "not suitable" (n = 262, 57%), followed by "suitable" (n= 135, 29%), and "questionable" (n = 65, 14%). The use category most often assigned by the evaluators was "for research and learning" (n = 126, 27%), followed by "access to material otherwise unavailable" (n = 102, 22%), "to find something fun and exciting" (n = 76, 17%), followed by "for shopping and consumer information" (n = 61, 13%), "for something to do when I'm bored" (n = 45, 10%), "for sports and game information" (n = 30, 7%), and finally, "to communicate with other people" (n = 22, 5%).

When compared to the use categories self-reported by the students responding to the computer-administered survey there is clearly a disparity between the way that students and media specialists view the content and potential use of these WWW sites. Students' self-reported uses of the WWW was as follows: "for research and learning" (n = 541, 52%), followed by "to find something fun and exciting" (n = 85, 8%), "to communicate with other people" (n = 74, 7%), "for sports and game information" (n = 65, 6%), "for something to do when I'm bored" (n = 56, 5%), "for access to material otherwise unavailable" (n = 55, 5%), and finally, "for shopping and consumer information" (n = 10, 1%).

The disparity between self-reported uses of the WWW and evaluators' assessments of actual sites visited invites several possible explanations. First, as an audience-centered theory of media use, uses and gratifications allows for individual interpretation of content. It should not be surprising that students and media specialists frequently envision different uses for the same Web site. Second, students may be responding to the survey with answers that they believe are socially acceptable. Even with the anonymity provided by the computer survey technique, students may feel some pressure to respond in a manner that is congruent with the stated purpose of the WWW in school as elaborated in the school district's Acceptable Use Policy-namely, academic research. However, there may be another factor at work here. It could be that students are starting out with the intention to conduct academic research, but are finding themselves frustrated or distracted by the other offerings so readily available on the WWW.

The analysis comparing domain and "suitability for academic research" indicated low ratings for .com and .net, with higher values for .org and .gov (see Table 3). In fact, the most frequently visited domain name (.com) had the lowest educational value and one of the least frequently visited domain names, (.gov), had the highest educational value as determined by the evaluation of the media specialists.

Table 3
Mean Suitability for Academic Research of Sites by Leading Domain Names

Domain Name	(N)	Mean suitability for academic research as assigned by coders *
.com	(410)	1.59
.org	(25)	2.78
.edu	(16)	2.44
.net	(12)	1.75
.gov	(9)	3.0
.us	(5)	2.0
other	(23)	1.94

Note: * 1 = not suitable, 2 = questionable, 3 = suitable

Discussion

In order for educators and researchers to evaluate the benefit of WWW use by students in public schools it is necessary to begin by attempting to understand how students perceive the WWW, what they use it for, and what gratifications they receive during periods of access. This research explored the active and goal-directed use of the WWW by middle school and high school students in 10 public schools located in five public school districts. Consistent with the study's exploratory nature the results included the identification of gratifications sought from this new electronic interactive medium within a school setting. While this study did not provide answers to questions about the effect of WWW usage on student performance it did provide answers to a more fundamental set of questions. Two survey instruments were used to assess the following: students' affinity for the WWW, the amount of time spent using the WWW, students' self-assessed skill level, their beliefs about the relative value of the WWW as a source of both information and entertainment and as a means of communication, and their reasons for using or not using the WWW. And finally, student use of the WWW was monitored by sampling actual sites visited and by content-analyzing these sites for educational value.

Granted there is much excellent information available on the WWW. But as this study's content analysis of sites visited seems to indicate, students frequently are either not looking for it, or if they are, are unsuccessful in finding it. It is quite possible that users who approach a Web search with instrumental intentions may soon find themselves distracted by the entertaining and diverting offerings available. The ease with which one can travel to any corner of the vast Web can be both a blessing and a curse. And this is not a unique observation. A study of 6th and 9th grade science students found that without substantial guidance and assistance, students were often unsuccessful in locating useful academic information on the WWW (Lyons, Hoffman, Krajcik, & Soloway, 1997). According to the researchers, "one overall theme is clear from the data: students need a tremendous amount of support to be successful in online inquiry" (p. 12).

Commercialization of the WWW

The commercialization of the WWW and the growth of online advertising is another area of growing concern for educational technology advocates. The disproportionate use of commercial WWW sites by students in this study is just one indicator of the potential exposure of children to advertising. Students are often unaware of the questionable nature and value of information from commercial WWW sites. Lyons et al. (1997) found that students "often choose a commercial site (.com in the URL) over a government (.gov) or education (.edu) site" (p. 21-22), an observation supported by this research.

While unregulated advertising itself is cause for concern, the unique capability afforded by the WWW to collect user information and track usage raises even greater concern. The Zap Me corporation announced a program to give free computers with satellite-based Internet service to schools in exchange for the opportunity to include advertising in a corner of the monitor. In a New York Times article dated February 25, 1999, Richtel described the Zap Me system, which tracks the user's "grade level, sex and Zip code" in order to "dish out age and sex-appropriate advertisements" (p. G7). At the time of the article the company had "given computers to 55 schools in eight states." This kind of targeted advertising and the collection of user data for commercial purposes should be of concern not only to privacy advocates but also to educators and parents who are concerned about the negative effects of consumer-driven culture.

Socialization

More than a decade ago Rosengren and Windahl (1989) wrote,

today's moral panics about videos, cable, satellites, computer games and the like, may concern rather ephemeral phenomena. It may be true that for some time media novelties may have a capacity to spell-bind children, preventing them from other, perhaps better, activities. But it is probably also true that such an influence will be transient and will be greatly reduced or even vanish as the "new" media find their place in society. (p. 250)

While some of the moral panic spoken of by Rosengren and Windahl may have faded, it appears obvious that the "new" medium of the moment, the WWW, has simply attracted, and perhaps amplified, the concern that was once focused on the old media. According to Stephen Kerr, professor in the College of Education at the University of Washington,

The Net's beauty is that it's uncontrolled... It's information by anyone, for anyone. There's racist stuff, bigoted, hate-group stuff, filled with paranoia; bomb recipes; how to engage in various kinds of crimes, electronic and otherwise; scams and swindles. It's all there. It's all available... That's the antithesis of what classroom kids should be exposed to. (quoted in Oppenheimer, 1997, p. 61)

Concern about inappropriate material available on the WWW is one reason for the widespread use of acceptable use policies. Perhaps the issues of greatest concern focus on the presence of hate speech, sites promoting violent behavior and the means to carry out violent activities, pornography, and sexually explicit material. The unregulated nature of the WWW and its diversity of content providers serves to ensure the widest possible range of content. While other educational media are controlled by the school teachers and administrators who make decisions about what books, videos, and magazines to place in the media collection, the unfiltered WWW has been made available to students who frequently operate on an honor code of self-regulation.

Limitations

The most obvious limitation of this study is the sample and the methodology employed in its selection. Use of non-probabilistic sampling for schools chosen and self-selection of students taking the computer-administered surveys are acknowledged as restricting the generalizability of this study. Because of the non-random nature of the sample, generalization to the larger population of US adolescents is discouraged. However, this study aided in the identification of several motivations for use of the WWW at school and these offer heuristic value for future research.

As Charney (1996) found using a similar approach to study college students' use of the WWW, a complicating factor is that student use of this medium is confounded by use that has been assigned by a teacher. Unlike uses and gratifications studies of other media, use of the WWW, especially in a school setting, is a mixture of uses motivated by personal interest as well as those prescribed by authority figures. In this study there was no way to differentiate student use that was self-motivated versus use that was encouraged or even mandated by teachers.

Also, because of the need to protect the anonymity of respondents, students were not identified in a way that allowed comparisons between the two survey instruments. Neither were comparisons possible between the responses to the survey instruments and the content analysis of WWW sites visited by students. A research design that allowed for anonymous tracking of responses from one survey instrument to the next, and then tied WWW sites visited to a specific anonymous respondent, would have added heuristic value to the study.

On a related note, the analysis of sites visited by students did not take into account sites that were visited accidentally or for only a short period of time. It is quite possible that sites ranking low on "suitability for academic research" were visited only briefly while more suitable sites were visited for longer periods of time, or even printed for later use.

Conclusions

In the opening chapter of Failure to Connect, Healy (1998) stated: "Today's children are the subjects of a vast and optimistic experiment" (p. 17). Referring to the use of computers for educational purposes, Healy argued that computers raise more questions than they answer and concluded with a call for accountability and common sense. Cuban (1996) had a similar response and couched his assessment in an historical context.

First, techno-reformers' claims for what new machines can do are so inflated that public expectations continually get disappointed. Overselling has been (and continues to be) part of a familiar American cycle of creating a crisis, naming schools or teachers as a problem, and putting forward new machines (film, television, computers) as the best solution. Yet each technological innovation has had, at best, an uneven record in entering schools and classrooms. Why?

Based on this exploration of WWW use in school, several findings would appear to have policy implications for schools using or making plans to use the WWW for educational purposes. First, while students believe the WWW to be a valuable source of reliable information, their use of the WWW suggests other motivations. Analysis of sites visited indicated that by nearly a two-to-one margin students visited sites rated "unsuitable for academic research" versus sites rated "suitable." Seeking out "pleasurable experience" appeared to win out over "learning information" (Swanson, 1992) when students were given access to the WWW within the school setting. Furthermore, the types of sites visited most frequently, i.e., commercial sites, were rated as having the lowest educational value.

Also of note is the incongruity between students' self-reported use of the WWW and the uses suggested by the analysis of sites visited by students. Either students falsely reported their intentions or intervening variables affected the process of searching for and obtaining relevant information. One untested hypothesis to emerge from this study is that the best of intentions may be confounded by the ease with which students can access a myriad of competing sites that vie for their attention. Another possibility is that the students' understanding of research is more broadly defined and includes looking for content that has little or no relationship to traditional academic pursuits.

When it comes time to evaluate the appropriateness and effectiveness of media technology in the schools media effects researchers cannot have it both ways. Either media effects are real and the potential benefit of educational media must be balanced by constant vigilance against access to WWW sites that are at best a distraction and at worst a hindrance to the educational and social development of our children. Or, media effects are limited and mediated by user motives, attitudes, and use patterns, and any potential benefit of educational media in the schools is contingent on the proper psychological and sociological predictor variables. If this is the case, attention to these factors must be a top priority and WWW access must be implemented with the goal of creating the proper climate for learning to occur. In either case WWW literacy efforts-teaching students how to most effectively use the best resources on the WWW-are sorely needed. Since picking and choosing only the best WWW resources for students is not a viable option, giving students the tools to make wise decisions about media content is crucial.

Endnotes

1 According to Wartella and Reeves (1985) the first recorded instance of concern about media's effect on children was Plato's warning about storytellers in The Republic.

2 One could argue that Illich (1970) envisioned the WWW as an educational resource long before its time when he wrote, "The current search for new educational funnels must be reversed into the search for their institutional inverse: educational webs which heighten the opportunity for each one to transform each moment of his living into one of learning, sharing, and caring" (pp. xix-xx, emphasis in the original). Illich continued, "We need research on the possible use of technology to create institutions which serve personal, creative, and autonomous interaction and the emergence of values which cannot be substantially controlled by technocrats. We need counterfoil research to current futurology" (p. 2). In describing an alternative to school, Illich might have been describing the modern listserv or chat forum: "The most radical alternative to school would be a network or service which gave each man [sic]the same opportunity to share his [sic] current concern with others motivated by the same concern" (p. 19). The great difference, however, between what Illich envisioned and what WWW advocates are promoting is the locus of responsibility.

3 For the full study, including survey instruments, see Ebersole (1999).

4 It is interesting to note that the list of "uses" is similar those found by researchers exploring the uses and gratifications of "old" media. Information, entertainment, social utility, passing the time, and other traditionally defined uses of the media are present with some distinctions made possible by the interactive nature of this new medium.

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